

DOCUMENT RESUME

ED 187 371

JC 800 291

AUTHOR Fast, Casey
 TITLE Making the Best Better: The LCC Individualized Math Story.
 PUB DATE May 80
 NOTE 10p.: Paper presented at the Oregon Developmental Educational Association (Eugene, OR, May 1980)
 EDRS PRICE MF01/PC01 Plus Postage.
 DESCRIPTORS College Faculty; *College Mathematics; *Community Colleges; Differentiated Staffs; *Dropout Prevention; *Independent Study; *Learning Laboratories; Mastery Learning; Mathematics Instruction; Mathematics Teachers; Program Descriptions; Remedial Programs; School Holding Power; Staff Utilization; Student Teacher Relationship; Teacher Role; Two Year Colleges; Withdrawal (Education)
 IDENTIFIERS Lane Community College OR

ABSTRACT

The independent study Math Resource Center (MRC) program at Lane Community College offers seven courses on an "open-entry/open-exit" basis: Math 1, 2, and 3: Elementary, Intermediate, and College Algebra; and Dosage Computation. Students may enroll at any time, learn at their own rate, and leave class when they have developed their skills to the desired level. Differentiated staffing (aides, assistants, instructors, and director) provides many levels of instruction through self-study texts, single-concept video tapes, tutoring, and small group instruction. Course procedures include pre-testing and the use of student study records, a study guide, and a student reference manual. Even though staff members serve primarily to encourage student interest, involvement, and effort, 46% of the MRC students in 1977 failed to complete any course work. Findings of recent studies of math knowledge, skills, understanding, and applications reveal many problems that may account to an extent for this high dropout rate, but instructors' emphasis on knowledge rather than on students is also a contributing factor. One strategy for improving student retention is based on faculty efforts to learn about their students through the collection of personal data about hobbies and life goals, one-to-one encouragement in letters or by telephone, and careful monitoring of progress. (JP)

 * Reproductions supplied by EDRS are the best that can be made *
 * from the original document. *

ED187371

MAKING THE BEST BETTER
THE LCC INDIVIDUALIZED MATH STORY

Presented by

Casey Fast

Lane Community College

Eugene, Oregon

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Casey Fast

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

The basic facts about the LCC Mathematics Department are not too profound. It employs 12 full time instructors, one department head, two secretaries, and approximately 15 part time faculty, instructional assistants, and aides. These combine forces to educate about 520 FTE (7500 head count) students annually, making mathematics the third largest LCC credit department in enrollment. The yearly budget currently runs over \$550,000.

Math students at LCC can choose from 109 lecture sections of 31 different courses, or select any of seven individualized, independent study courses in the Math Resource Center (MR). Roughly 52% of our enrollees would be classified as developmental, which means that 3900 of them have mathematical competencies beneath junior high school algebra.

In his book, Human Characteristics and School Learning, Benjamin S. Bloom comments on student differences in backgrounds, abilities, goals, and aspirations by saying, "Variations in learning and the level of learning of students are determined by the students' learning history and the quality of education they have received." For these educational differences, should we be providing equal educational opportunity? No. Bloom states we should provide equality of learning outcomes rather than equality of opportunity. This is precisely where individualized study programs like the MRC of LCC excel.

The independent Study Math Resource Center Program offers seven courses on an "open entry/open exit" basis: Math 1, Math 2, Math 3, Elementary Algebra, Intermediate Algebra, College Algebra, and Dosage Computation. Students may enroll at any time, learn at their own rate, and leave class when they have developed skills to a desired level. Differentiated staffing (aides,

assistants, instructors, and director) provides many levels of instruction through self-study texts, single concept video tapes, tutoring, and small group discussions. Electronic calculators, audio tapes, and other hands-on materials are also available.

On the first two days of each term, when the bulk of our students first appear in the MRC, they are required to attend group orientation sessions where they receive a complete explanation of the system, handouts, instructions on video usage, and a tour of the center. They are also tested and transferred to different course levels if necessary. Students who register at other points in the term are oriented individually.

As an example of our materials and procedures, consider the handouts for Math 2, a course in applications of arithmetic with instruction in calculator usage, the metric system, simple algebra, and reading of dials, scales, calipers, and the like.

The pretest is fairly simple. It is self-correcting and designed for item analysis. It shows whether a student should move to a different course or review some preparatory skills.

The student study record serves several purposes. One copy is placed on file, to be used for recording of exercise/test completion and referred to for grade compilation. One copy is retained by the student, serving as an important guide to study rate and test dates.

The study guide is much more specific. It spells out precisely what books, video tapes, calculators, and equipment will be necessary for each lesson.

The Student Reference Manual is a general information handbook given to all MRC students. It explains all procedures and policies, including grade determination: If credit is desired all exercises must be initialed by an instructor and recorded on the SSR. Completed before test taking, these add a 4 point bonus to the test score on which 90 and above is an A; 80-89 a B; 70-79 a C; and below 70 a retest. No F's are given, so failure is impossible. Retests for higher scores are encouraged; however, note that the maximum score on the second testing is 90 and on the third, 80.

One of the MRC's best features is its differentiated staffing (see Job Descriptions). The MRC director, in conjunction with an advisory committee, supervises all operations on release time from his regular load. Next in the staff line are the faculty, who spend 5-10 weekly hours at help stations or in materials development, test revision, video work, etc.

The real work horses of the system are the aides and assistants; it is they who handle most of the one-to-one tutoring, all test grading and the clerical work. Assistants are required to have math training through college calculus and aides must be qualified at clerical and receptionist duties--but their main employment prerequisite is a friendly, caring, responsive attitude.

Elbert Hubbard, folksy philosopher of the early 1900's, wrote, "You can lead a boy to college, but you can't make him think." Ideally, our students must not only learn mathematics, but they must also learn to think for themselves.

There is another Hubbard epigram which capsulizes our philosophy: "The object of teaching a child is to enable him/her to get along without the teacher."

Since our system is "self-correcting," revealing student errors and introducing changes as needed, the staff members serve primarily as motivators. They encourage student interest, involvement, and hard work.

Studies in 1977 showed that 46% of our MRC students failed to complete any of their course work. General lecture classes fared slightly better with a 42% rate of attrition. Specific higher level courses, like calculus and differential equations, showed only 10-12% shrinkage, but developmental courses sometimes lost as much as 80%.

The National Assessment of Educational Progress conducted national surveys in both 1973 and 1978 of 71,000 students which examined the achievement in math knowledge, skills, understanding, and applications/problem solving. Some of their findings:

Mathematical Knowledge--students appear to have a good grasp on basic arithmetic facts

*Over 90% of 13- and 17-year-olds could answer basic addition, subtraction, and multiplication items correctly.

*75% of the 17-year-olds knew the number of quarts in a gallon.

Mathematical Skills--many could compute with whole numbers; fewer dealt with fractions, decimals, and percents:

*76% of 17-year-olds correctly multiplied 671 by 402.

*27% at age 17 could calculate 4% of 75.

Mathematical Understanding

*62% of 13-year-olds showed understanding of the area.

40% of 17-year-olds realized that if one picks a marble from a bag containing 8 red, 7 green, and 6 blue marbles, the marble picked is most likely not red.

Mathematical Applications--evidence is that students do not "think through" word problems.

*on a simple work problem containing some extraneous information, only 56% of the 13-year-olds solved it correctly.

42% of the 17-year-olds could successfully figure the area of the square when the length of only one side was given.

Achievement Differential, 1973-78

*Math achievement dropped over the 5-year period. 17-year-olds performed 4 percentage points lower.

Alexander W. Astin, in his book, Preventing Students from Dropping Out, writes that "the most 'dropout-prone' freshmen are those with poor academic records in high school, low aspirations, poor study habits, relatively uneducated parents, and small town backgrounds." His studies show that 56% of all men and 59% of all women enrollees at two-year public colleges drop out.

My own survey shows that 80% of incoming math students dislike math and consequently avoid it at all costs. Obviously, dropping out of math is easy when one has a prior aversion.

Combined, these studies gave some explanation as to why we were experiencing a high attrition rate, but said little about how to solve the problem. How could we sell mathematics to our students? How retain them in our classes?

Mutual of New York Insurance Company, faced with similar clientele questions, found an effective solution: increase its customer knowledge.

MONY now expects its sales people to spend 80% of their sales time in learning about the customer, prior to and during the sales presentation--concentrating on customer name, birthday, profession, hobbies educational background, names of spouse/children, club membership, etc. This information forms the nucleus of the sales presentation, while the remaining 20% of sales preparation

time is spent on product knowledge, i.e., the details of the product being sold.

Compare this to the way in which we teach mathematics. We spend virtually all our time on product knowledge. Each hour of class is filled with lectures to customers about whom we know almost nothing. Individualized programs often shuttle students off to a TV monitor or study area--out of human contact. It is no wonder that many students do not buy our mathematical ideas!

McKelvey, Albers, Libeskind, and Loftsguarden recently inquired into the training needs of two-year college mathematics teachers. The March, 1979, Two-Year College Mathematics Journal reported their findings, ranking the major problems in college mathematics teaching as:

1. Teaching unmotivated students.
2. Having to cover much more material than the students can absorb.
3. Too little time/energy for professional activities outside the classroom.
4. Lack of incentives for professional growth.
5. Coping with the deluge of remedial mathematics.

Yet, how did these same two-year college teachers respond to the question of adequate preparation for handling these problems? 89% of them rated courses in pure math (advanced calculus, abstract algebra, topology, etc.) as the most important part of the TYC teacher's preparation. What an incongruity! College teachers have been expecting to motivate students with product knowledge when they should have been emphasizing customer knowledge.

Don't misunderstand. Mathematical training product knowledge is essential. But according to the MONY success formula, the teacher should join every one

year spent in the study of math content to four years spent in the study of what students think, do and enjoy. For teachers of developmental or socially disadvantaged students, the message is even more clear--these students need to be known, to be understood, to be loved before they can be taught.

Acquiring customer knowledge of each individual when one teaches several classes may be quite a challenge, but there are many ways of handling this. One of the easiest methods is to collect each student's name, address, phone number, vital statistics, hobbies, life goals, and other pertinent data on a "3 x 5" card. The classroom set of cards can be filed or carried in a shirt pocket for quick reference and used in memorizing each student's name (preferably on the first day of class). As additional information about students is learned, it should be added to their cards. Students should be contacted by telephone or letter several times each year with encouragement, concern, or information, and notes about the date and nature of the contact recorded on the card. All of this works as a good communication and customer knowledge system.

The way to really get acquainted with students is to ask them questions.

Rudyard Kipling wrote:

"I have six serving men
(They taught me all I know).
Their names are What and Why and When
And How and Where and Who."

John E. Rouché has four rules for creating a positive learning environment.

They are to:

1. Know students by name;
2. Attend to each student;

3. Share yourself with students; and
4. Monitor student achievement.

Spring term, 1978, in the MRC I undertook an experiment on these rules. During that term I made a serious effort to be fully acquainted with every MRC student I encountered. I used "3 x 5" cards, memorized names, greeted students at the door, wrote them personal letters, carefully monitored their progress and provided rapid feedback. Each one knew he/she was special to me. They became "Casey's Clients."

I acquired 45 students--42 of them completed their desired courses of study. This amounted to a 93% completion rate customer knowledge payoff! I have always had similar success rates in applying the personal approach to teaching my lecture classes--I was not surprised.

The Alexander Astin studies verify my findings: "the most frequent reasons for dropping out for both men and women are boredom, financial difficulties, [and] dissatisfaction with regulations/rules." Of the dropouts he interviewed, 36% of the men and 25% of the women dropped because of boredom. On the other hand, student persistence depended "on the degree of personal involvement in campus life and environment." Boredom can be counteracted with personal involvement.

JUL 18 1980

UNIVERSITY OF CALIFORNIA
ERIC[®] CLEARINGHOUSE FOR
JUNIOR COLLEGES
96 POWELL LIBRARY BUILDING
LOS ANGELES, CALIFORNIA 90024
EE 36